REMARKS

This is in response to the Office Action dated August 10, 2011. Claims 1-23, 25-28, and 31 are currently pending.

Claim 1 stands rejected under Section 103(a) as being allegedly unpatentable over Yamaguchi in view of Stephenson. This Section 103(a) rejection is respectfully traversed.

Claim 1 requires that "*the liquid crystal medium has a negative dielectric anisotropy, and wherein the display element comprises first and second polarizers in crossed nicols orientation.*" For example and without limitation, see the instant specification at pages 29-30, 33 and Fig. 5.

Yamaguchi is discussed in the Background section of the instant specification as "Patent document 2." As explained on pages 7 and 10-12 of the instant specification, Yamaguchi has a positive (the opposite of the "negative" requirement of claim 1) type liquid crystal material. Thus, Yamaguchi is unrelated to the invention of amended claim 1, and instead teaches the opposite of the claim thereby teaching away from the claimed invention in multiple respects. Certain example non-limiting embodiments of this invention are advantageous over Yamaguchi ("Patent document 2") for the reasons discussed in the instant specification at page 10, line 12 through page 12, line 10, and page 18, line 14 through page 21, line 2, as Yamaguchi cannot realize the example advantages which may be realized by the invention of claim 1.

There would have been no logical reason to have modified Yamaguchi to meet claim 1 in these respects. The Office Action contends that it would have been obvious to have taken negative type LC material from Stephenson and used it in Yamaguchi because "that is suitable for the liquid crystal display device." This allegation is incorrect. The optical structures and functionality of the displays in Yamaguchi and Stephenson are very different, and they function much different optically due to the different types of LC used in both displays. Moreover, the

display of Stephenson as an example is a normal LCD that includes a LC medium in the LC phase – the device thus does not carry out display by exhibiting (i) an optical isotropy when no electric field is applied and (ii) an optical anisotropy when an electric field is applied as required by claim 1 – again teaching away from the invention of claim 1 and teaching against the combination due to the different optical functions of the different displays.

Additionally, Yamaguchi merely discusses each of Δn and $\Delta\varepsilon$ separately as a property of LC material. Yamaguchi does not disclose the technical idea of multiplying Δn by $| \Delta\varepsilon |$, let alone the idea of multiplying Δn by $\Delta\varepsilon$. Yamaguchi further states that the LC should preferably be high, not in $| \Delta\varepsilon |$, but in $\Delta\varepsilon$, and that $\Delta\varepsilon$ should preferably be 5 or more, more preferably 15 or more (e.g., col. 5:29-36). Yamaguchi therefore teaches away from the use of LC with a negative $\Delta\varepsilon$. This evidences the patetable nature of claim 1. There is no disclosure or suggestion in Yamaguchi of $\Delta n \times |\Delta\varepsilon| \geq 1.9$ as required by claim 1. Moreover, there is no logical reason to have modified Yamaguchi to meet this requirement.

Yamaguchi et al. discloses (a) a display element which provides a Kerr effect by combining a comb electrode (horizontal electric field) with polarizing plates, and (b) a guest-host display element which provides a Kerr effect by combining a plate electrode (vertical electric field) with a coloring matter. However, Yamaguchi et al. uses a positive-type liquid crystal material, and thus anisotropy is exhibited in the electric field direction. If a negative-type liquid crystal is applied to such a display element, molecules become oriented without the direction being set in an in-plane direction perpendicular to the electric field direction. As a result, no anisotropy occurs, which makes it impossible to switch over between black and white. Thus, one of ordinary skill would never have provided negative-type liquid crystal in the device of Yamaguchi.

The display element is driven in an effective voltage which can drive a TFT by (i) using the horizontal alignment film as in certain embodiments of this invention, (ii) having the alignment processing direction of the upper and lower substrates parallel/antiparallel, and (iii) having $\Delta n \times |\Delta\epsilon|$ be of a numerical range as in certain embodiments of the subject application. Meanwhile, the display element of (b) is a display element using a so-called guest-host display mode, in which a positive-type liquid crystal material contains a coloring matter and eliminates the polarizing plates. Hence, how display is carried out is totally fundamentally different from the display mode of certain embodiments of this invention, i.e., the mode providing a display by using a negative-type liquid crystal material and exhibiting an optical anisotropy under crossed nicols. Therefore, the claimed invention cannot be accomplished just by applying a negative-type liquid crystal material to Yamaguchi et al., and the claimed invention of the subject application cannot be not easily arrived upon based on Yamaguchi et al.

As described in the description from page 18, line 14 to page 21, line 2 and the description from page 46, line 2 to page 50, line 7, certain embodiments of this invention were accomplished by finding that when an electric field is applied to the display element, which display element carries out driving in the phase next to the nematic phase, i.e. the isotropic phase that exhibits next to the nematic phase when the temperature rises, it turned out that (i) the effect of the orientation regulating force exerted over the surfaces of the alignment films and (ii) property resulting from the refractive index anisotropy Δn and the dielectric anisotropy $\Delta\epsilon$ of the liquid crystalline medium, i.e. the negative-type liquid crystalline mixture in the nematic phase showed up, in a case where display is carried out by applying an electric field between a pair of substrates which sandwich a substance layer including a negative-type liquid crystalline medium exhibiting a nematic liquid crystal phase and whose dielectric anisotropy $\Delta\epsilon$ is negative, which

substance layer exhibits an optical isotropy when no electric field is applied while exhibiting an optical anisotropy when an electric field is applied. Certain embodiments of this invention were found by studies performed by the inventors, and it is impossible to accomplish such a finding from Yamaguchi et al. whose base structure is the comb electrode structure and which presumes that a dielectric anisotropy $\Delta\epsilon$ uses a positive-type liquid crystalline medium throughout the specification. Moreover, such a finding cannot be achieved from Stephenson, III et al that neither discloses or suggests a display device which carries out a display by applying an electric field between a pair of substrates sandwiching a substance layer, the substance layer exhibiting an optical isotropy when no electric field is applied while exhibiting an optical anisotropy when an electric field is applied. The invention of claim 1 exhibits an optical anisotropy when an electric field is applied, based on a mechanism different from Yamaguchi et al.

Furthermore, with the configuration of claim 1, it is possible to promote the exhibition of the optical anisotropy not only in the area of the dielectric substance layer that is in the vicinity of each of the substrates but also in the area which is far from the substrates. Moreover, by having $\Delta n \times |\Delta\epsilon|$ be equal to or more than 1.9, it is possible in certain example embodiments of this invention to orient the liquid crystal molecules in a direction perpendicular to the electric field direction with a lower voltage, and achieve driving with an effective value of a maximum voltage that can be applied to the substance layer, with a cell thickness that can be manufactured, for example approximately 1.3 μm. It is, for example, thus possible to attain a narrower gap compared with a case of attaining a narrow gap between comb electrodes.

It is respectfully requested that all rejections be withdrawn. All claims are in condition for allowance.

Respectfully submitted,

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